REMARKS

Applicants affirm that in an interview held on Dec. 7, 2006, between Examiner Ghyka and Teri Fischer, a staff member of the law firm of Applicants representative, Anthony Palagonia, that only the use of form 326AE was discussed in the restriction requirement mailed December 1, 2006 and that Examiner Ghyka indicated it was an error and that Application 10/711,771 is not under accelerated examination.

The Examiner objected to claim 15 because of the following alleged informalities: the word "abut" in the last line. In response, Applicants have amended claim 15 to remove the word "abut."

The Examiner rejected claims 10-16 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Gardner et al. (US 5,936,287

The Examiner rejected claims 17-20 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Gardner et al. as applied to claims 10-16 above, and further in view of Wu (US 5,930,617).

Applicants respectfully traverse the § 103 rejections with the following arguments.

35 U.S.C. § 103(a)

The Examiner rejected claims 10-16 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Gardner et al. (US 5,936,287) stating) stating: "Gardner et al disclose a nitrogenated gate structure for improved transistor performance. Gardner et al disclose providing a substrate; forming a dielectric layer on a top surface of the substrate; forming a polysilicon layer on a top surface of said dielectric layer. See column 3, lines 6-12. Moreover, Gardner et al disclose implanting a first portion of the polysilicon layer with N-dopant species, said N-dopant species contained within the polysilicon layer; implanting a second and different portion of the polysilicon layer with P-dopant species, said P-dopant species contained within the polysilicon layer. See column 4, lines 5-15, and Figures 8-9. Furthermore, Gardner et al. disclose implanting the polysilicon layer (including the first portion) with a nitrogen containing species (about 1 x 10^{16}/cm2) . See column 3, lines 12-15 and column 5, lines 35-40.

Gardner et al differs from the present Claims in that it does not disclose the nitrogen containing species are essentially contained within the polysilicon layer.

It would have been obvious to one of ordinary skill in the art that the nitrogen containing species is essentially contained in the polysilicon layer, as Gardner et al discloses a blanket implant of the polysilicon layer and it would be obvious for one of ordinary skill in the art to optimize the dosage of nitrogen, so that the nitrogen remains essentially in the polysilicon layer and not the dielectric layer underneath. Discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. See *In re Antonie* 195 USPQ 6 (CCPA 1977). In the present case it would be obvious for one of ordinary skill in the art to optimize the dosage of the ion implant so that the nitrogen species are essentially contained in the polysilicon layer."

Applicants respectfully point out that FIGs. 1 through 5 of Gardner et al. describe a first embodiment in which nitrogen 26 is implanted before patterning polysilicon layer 24 into gates 32 and 34 and layer 24 is either doped or undoped polysilicon so both gates 32 and 34 are doped the same. Applicants respectfully point out that FIGs. 6-10 of Gardner et al. describe a second embodiment in which nitrogen 36 is implanted after patterning polysilicon layer 24 in gates 32 and 34. After the nitrogen implantation into gates 32 and 34, gates 32 and 34 are doped N-type and P type at the same times sources and drains are formed in wells 14 and 16. Applicants point out that these embodiments are mutually exclusive as when the nitrogen species implant is performed relative to when the polysilicon patterning is performed. Further in the second embodiment Gardner et al. specifically teaches in col. 5, lines 19-21 that "In this embodiment, nitrogen species will be introduced into the source/drain regions of P-well 16 and N-well 14."

First, Applicants respectfully contend that claim 10, as amended, is not unpatentable over Gardner, because Gardner does not teach or suggest each and every feature of claim 10. For example, Gardner does not teach or suggest that "after performing (a), (b), (c), (d), (e) and (f), (g) patterning said first portion of said polysilicon layer into a first polysilicon line and patterning said second portion of said polysilicon layer into a second polysilicon line."

In Applicants claim 10, steps (d) and (e) implant N dopant into the first portion and P dopant into the second portions of the polysilicon layer, step (f) implants nitrogen into the first portion of the polysilicon layer and step (g) patterns the polysilicon layer into first and second lines only **after** (d), (e) and (f) have been performed. In the first embodiment of Gardner et al., patterning (g) is performed **before** (e) implanting N dopant into the first portion and P dopant into the second portions of the polysilicon layer. In the second embodiment of Gardner et al.,

step (f) implants nitrogen into the first portion of the polysilicon layer **before** (f) implanting nitrogen into the first portion of the polysilicon layer.

Second, just because Gardner teaches a blanket implant of nitrogen does not provide a basis for the assumption that one of ordinary skill in the art would assume (or even want) the nitrogen to remain essentially in the polysilicon layer. The Examiner must support such an assumption with evidence.

Third, the Examiner stated: "Gardner et al. differs from the present claims in that it does not disclose the nitrogen species are essentially contained within the polysilicon layer." In fact, Gardner et al. actually teaches in col. 2, lines 21-23 that "the presence of nitrogen within source/drain regions results in an increase in drive current without a corresponding increase in leakage current." Thus Gardner et al., actually teaches away from Applicants requirement that "said first nitrogen containing species essentially contained within said polysilicon layer" since this benefit would not be available in a structure made using the method of Applicants claim 10.

Fourth, Applicants do not claim any "optimization" in claim 10, merely a limitation of where the nitrogen is, so the Examiner arguments based on optimization are not applicable to claim 10.

Fifth, the Examiner has not provided any evidence that one of ordinary skill in the art would know that nitrogen dosage is a results effective variable for controlling oxidation rate. The Examiner must provide evidence to support an appeal to common sense and basic knowledge. There must be some concrete evidence in the record. *In Re Zurko*, 258 F.3d 1379, 59 U.S.P.Q.2d 1693 (Fed. Cir 2001)

Based on the preceding arguments, Applicants respectfully maintain that claim 10 is not unpatentable over Gardner, and that claim 10 is in condition for allowance. Since claims 11-31

depend from claim 10, Applicants contend that claims 11-31 are likewise in condition for allowance.

As to claims 12-16, the Examiner stated: "Gardner et al does not disclose the implanted nitrogen concentration or relative concentration of N dopant. It would have been obvious for one of ordinary skill in the art to arrive at the peak concentrations of nitrogen and N-dopant, as arriving at the optimum ranges would have been a matter of optimization, within the level of one of ordinary skill in the art. Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. See *Allen v. Coe* 57 USPQ 136."

Applicants point out Gardner et al. is utilizing nitrogen to allow thinner gate dielectrics to be used (see Gardner et al. col. 2, lines 5 to 19). Applicants point out claims 12 14, 15 and 16 require a relationship between the nitrogen and the N-dopant species in the gate electrode. No such relationship is taught by Gardner et al. In fact, no specific dopant concentrations are taught by Gardner et al. at all. Before routine optimization of two variables can be obvious there must be recognition in the prior art of (1) a relationship between the variables (2) a result to be achieved and (3) that optimization of the variables will achieve the desired result. There is no teaching in Gardner that a **relationship** between nitrogen concentration **and** N-dopant levels in the gate electrode has any effect on oxidation rate, drive current or any other parameter. The Examiner must provide evidence to support an appeal to common sense and basic knowledge.

Further, the Examiner has not provided any evidence that one of ordinary skill in the art would know that both nitrogen dosage and N-dopant concentration are results effective variables

for controlling oxidation rate. The Examiner must provide evidence to support an appeal to common sense and basic knowledge. There must be some concrete evidence in the record. *In Re Zurko*, 258 F.3d 1379, 59 U.S.P.Q.2d 1693 (Fed. Cir 2001).

The Examiner rejected claims 17-20 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Gardner et al. as applied to claims 10-16 above, and further in view of Wu (US 5,930,617).

As to claim 19, Applicants find no teaching in either Gardner et al. or Wu that "said nitrogen containing species retards oxidation of said NFET gate electrode." as Applicants claim requires. Gardner does not even teach oxidation of the gates and while Wu teaches oxidation of a nitrogen doped silicon, there is no teaching of the nitrogen affecting the oxidation rate. See Wu col. 54, lines 24 to 28 which is the only teaching of oxidizing nitrogen-doped silicon in Wu. Further, the nitrogen containing silicon layer of Wu is not party of gates 8, but a layer 14 (see Wu FIGs. 5 and 6) formed over gates 8 that already has been oxidized (layer 12 on the sidewalls of gates 6).

CONCLUSION

Based on the preceding arguments, Applicants respectfully believe that all pending claims and the entire application meet the acceptance criteria for allowance and therefore request favorable action. If the Examiner believes that anything further would be helpful to place the application in better condition for allowance, Applicants invites the Examiner to contact Applicants' representative at the telephone number listed below. The Director is hereby authorized to charge and/or credit Deposit Account 09-0456.

Respectfully submitted,
FOR: Adkisson et al.

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/Anthony M. Palagonia/
Anthony M. Palagonia
Registration No.: 41,237

Schmeiser, Olsen & Watts
22 Century Hill Drive - Suite 302
Latham, New York 12110
Telephone (518) 220-1850
Facsimile (518) 220-1857

Agent Direct Dial Number (802) 899-5460